WHAT IS CLAIMED IS:

1. A radio frequency device compromising:

a first substrate comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers forming a first circuit used in the operation of the device,

a second substrate comprised of a second plurality of LTCC layers forming a second circuit used in the operation of the device, and

at least one microelectromechanical ("MEMS") device between the first and second substrates,

wherein the second substrate is bonded to the first substrate so as to enclose the at least one MEMS device between the first and second substrates.

2. The radio frequency device recited in claim 1, wherein the second substrate is bonded to the first substrate to form a hermetically sealed chamber containing the at least one MEMS device.

3. The radio frequency device recited in claim 1 further comprising a plurality of vertical interconnects extending through and interconnecting the first and second pluralities of LTCC layers comprising the first and second substrates.

4. The radio frequency device recited in claim 1 wherein the first plurality of LTCC layers comprising the first substrate includes a buffer layer that is a substrate on which the at least one MEMS device is fabricated.

5. The radio frequency device recited in claim 1 further comprising at least one integrated circuit ("IC") bonded to the first substrate.

6. The radio frequency device recited in claim 5 wherein the first plurality of LTCC layers includes an interconnect layer through which the at least one integrated circuit is connected to the first substrate.

7. The radio frequency device recited in claim 1 further comprising a plurality of discrete components buried-in the first plurality of LTCC layers.

8. The radio frequency device recited in claim 7 wherein the plurality of buried-in discrete components includes components resistors, capacitors and/or inductors.

9. The radio frequency device recited in claim 1 wherein the first and second pluralities of LTCC layers each include at least one passive microwave device selected from the group consisting of transmission lines, couplers and dividers.

10. The radio frequency device recited in claim 5 wherein the first plurality of LTCC layers includes a cavity in which the at least one integrated circuit is bonded to the first plurality of LTCC layers.

11. The radio frequency device recited in claim 5 wherein the at least one integrated circuit includes at least one circuit from the group consisting of low-frequency analog/digital ICs, MMICS, and RFICs.

12. The radio frequency device recited in claim 5 wherein the at least one integrated circuit includes at least one circuit from the group consisting of a control circuit for the MEMS device, a power module for the MEMS device, a microprocessor, a signal processor, a high frequency power amplifier, a high frequency low noise amplifier, and high frequency up and down converters.

13. The radio frequency device recited in claim 5 wherein the second plurality of LTCC layers further comprises includes a ground shielding extending through the second plurality of LTCC layers to shield the at least one MEMS device or IC from radiating components in other layers.

14. The radio frequency device recited in claim 1 wherein the first and second pluralities of LTCC layers include ground planes for shielding the first and second circuits.

15. The radio frequency device recited in claim 4 wherein the buffer layer is comprised of a plurality of layers.

16. The radio frequency device recited in claim 5 wherein the integrated circuits are flip-chip bonded to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

17. The radio frequency device recited in claim 5 wherein the integrated circuits are wire-bonded to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

18. The radio frequency device recited in claim 5 wherein the integrated circuits are flip-chip bonded to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

19. The radio frequency device recited in claim 5 wherein the integrated circuits are wire-bonded to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

20. A radio frequency system compromising:

at least one microelectromechanical ("MEMS") device,

at least a first plurality of LTCC layers forming at least one first circuit used in the operation of the MEMS device,

at least a second plurality of LTCC layers forming at least one second circuit used in the operation of the MEMS device,

the MEMS device being formed between the first and second pluralities of LTCC layers, the second plurality of LTCC layers being bonded to the first plurality of LTCC layers whereby the MEMS device is enclosed between the first and second pluralities of LTCC layers.

21. The radio frequency system recited in claim 20 wherein the second plurality of LTCC layers is bonded to the first plurality of LTCC layers to form a hermetically sealed chamber containing the at least one MEMS device.

22. The radio frequency system recited in claim 20 wherein the first plurality of LTCC layers includes a buffer layer that serves as a substrate on which the at least one MEMS device is fabricated.

23. The radio frequency system recited in claim 20 further comprising at least one integrated circuit bonded to the first plurality of LTCC layers.

24. The radio frequency system recited in claim 23 further comprising a plurality of integrated circuits including at least one circuit selected from the group consisting of low-frequency analog/digital ICs, MMICs, and RFICs.

25. The radio frequency system recited in claim 23 further comprising a plurality of integrated circuits including at least one circuit selected from the group consisting of a control circuit for the MEMS device, a power module for the MEMS device, a microprocessor, a signal processor, a high frequency power amplifier, a high frequency low noise amplifier, high frequency down-converters.

26. A MEMS device comprising:

a first ceramic module formed from of a first plurality of dielectric layers, the first plurality of dielectric layers including at least one first circuit layer;

a second ceramic module formed from of a second plurality of dielectric layers, the second plurality of dielectric layers including at least one second circuit layer,

a layer between the first and second ceramic modules including at least one microelectromechanical ("MEMS") switch forming at least one phase-shifter, the

second ceramic module being bonded to the first ceramic module to thereby form a cavity in which the MEMS switch is located.

27. The MEMS device of claim 26, wherein the ceramic modules are formed using an LTCC process.

28. The MEMS device of claim 26, wherein the ceramic modules are formed using an HTCC process.

29. The MEMS device of claim 27, wherein the ceramic modules are formed from 943 Green Tape™.

30. A MEMS device comprising:

a first ceramic module formed from of a first plurality of dielectric layers, the first plurality of dielectric layers including at least one first circuit layer, a buffer layer, and a plurality of interconnections between the at least one first circuit layer and the buffer layer;

a second ceramic module formed from of a second plurality of dielectric layers, the second plurality of dielectric layers including at least one second circuit layer, a cover layer, a plurality of radiation layers, and a plurality of interconnections between the second circuit layer, cover layer, and radiation layers; and

a layer between the first and second ceramic modules including at least one microelectromechanical switch forming at least one phase-shifter.

31. The MEMS device of claim 30 further comprising a plurality of integrated circuits mounted on the first ceramic module, and wherein the first plurality of dielectric layers further includes a plurality of interconnecting layers for connecting the integrated circuits to the dielectric layers forming the first and second ceramic modules.

32. The MEMS device of claim 30, wherein the ceramic modules are formed using an LTCC process.

33. The MEMS device of claim 30, wherein the ceramic modules are formed using an HTCC process.

34. A MEMS device comprising:

a first ceramic module formed from of a first plurality of dielectric layers, the first plurality of dielectric layers including at least one first circuit layer;

a second ceramic module formed from of a second plurality of dielectric layers, the second plurality of dielectric layers including at least one second circuit layer,

a layer between the first and second ceramic modules including at least one microelectromechanical ("MEMS") switch, the second ceramic module being bonded to the first ceramic module, to thereby form a cavity in which the MEMS switch is located,

a plurality of integrated circuits mounted on the first ceramic module,

a plurality of interconnecting layers extending through the first plurality of dielectric layers for connecting the integrated circuits to the dielectric layers forming the first and second ceramic modules, and

a plurality of discrete components buried-in the first and second pluralities of dielectric layers.

35. The MEMS device of claim 34, wherein the ceramic modules are formed using an LTCC process.

36. The MEMS device of claim 35, wherein the ceramic modules are formed from 943 Green Tape™.

37. The MEMS device of claim 34, wherein the ceramic modules are formed using an HTCC process.

38. An electrical device comprising:

a first ceramic module formed from of a first plurality of dielectric layers, the first plurality of dielectric layers including at least one first circuit layer, a buffer layer, and a plurality of interconnections between the at least one circuit layer and the buffer layer;

a second ceramic module formed from of a second plurality of dielectric layers, the second plurality of dielectric layers including at least one second circuit layer, a cover layer, and a plurality of interconnections between the second circuit layer and the cover layer; and

a layer formed between the first and second ceramic modules including at least one microelectromechanical ("MEMS") switch.

39. The electrical device of claim 38 further comprising a plurality of integrated circuits mounted on the first ceramic module, the first plurality of dielectric layers further including interconnecting layers for connecting the integrated circuits to the dielectric layers forming the first and second ceramic modules.

40. The electrical device recited in claim 39 wherein the plurality of integrated circuits includes at least one circuit selected from the group consisting of low-frequency analog/digital ICs, MMICs, and RFICs.

41. The electrical device recited in claim 39 wherein the plurality of integrated circuits includes at least one circuit selected from the group consisting of a control circuit for the electrical device, a power module for the electrical device, a microprocessor, a signal processor, a high frequency power amplifier, a high frequency low noise amplifier, a high frequency down-converter.

42. The electrical device of claim 38, wherein the ceramic modules are formed using an LTCC process.

43. The electrical device of claim 38, wherein the ceramic modules are formed using an HTCC process.

44. A radio frequency device compromising:

a first substrate comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers,

a second substrate comprised of a second plurality of LTCC layers, and

at least one microelectromechanical ("MEMS") device between the first and second substrates,

wherein the second substrate is bonded to the first substrate so as to enclose the at least one MEMS device between the first and second substrates.

45. The radio frequency device as recited in claim 44 wherein said device is a tunable capacitor.

46. The radio frequency device as recited in claim 44 wherein said device is an attenuator.

47. The radio frequency device as recited in claim 44 wherein said device is a filter.

48. The radio frequency device as recited in claim 44 wherein said device is a reconfigurable antenna.

49. The radio frequency device as recited in claim 44 wherein said device is a reconfigurable power amplifier.

50. The radio frequency device as recited in claim 44 wherein said device is a low-noise amplifier.

51. The radio frequency device as recited in claim 44 wherein said device is a variable controlled oscillator.

52. The radio frequency device as recited in claim 44 wherein said device is a mixer.

53. The radio frequency device as recited in claim 44 wherein said device is a variable capacitor.

54. The MEMS device of claim 27, wherein the ceramic modules are formed from 951 Green Tape™.

55. The MEMS device of claim 35, wherein the ceramic modules are formed from 951 Green Tape™.

56. A method of forming a radio frequency ("RF") device including at least one MEMS device comprising the steps of:

fabricating a first module from a first plurality of low-temperature co-fired ceramic ("LTCC") layers, the first plurality of layers forming at least a first circuit used in the operation of the MEMS device;

fabricating a second module from a second plurality of low-temperature co-fired ceramic ("LTCC") layers, the second plurality of layers forming at least a second circuit used in the operation of the MEMS device;

polishing a surface of a front layer of the first module to be used as a substrate after fabrication of the first module is completed;

fabricating on the front layer the at least one MEMS device using MEMS processing; and

bonding the first and second modules together to thereby form a cavity containing the at least one MEMS device.

57. The method of forming a RF device as recited in claim 56 further comprising the steps of polishing a surface of a back layer of the second module to be used as a cover after fabrication of the second module is completed and applying two-component brazing materials on the front and back layers prior to bonding the first and second modules together.

58. The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed using eutectic bonding.

59. The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed using an insulating layer such as glass-frit.

60. The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed using an insulating layers such as a thermalsetting polyimide film.

61. The method of forming a RF device as recited in claim 56 wherein the step of applying two-component brazing materials on the front and back layers comprises the steps of:

depositing a plurality of first contact pads on a front layer of the first module;

planarizing the front layer of the first module;

depositing an adhesion layer and a soldering conductor on the first contact pads;

firing the first module at a temperature greater than 800º C;

depositing a plurality of second contact pads on a back layer of the second module;

planarizing the back layer of the second module;

depositing an adhesion layer and a soldering conductor on the second contact pads; and

firing the first module at a temperature greater than 800º C.

62. The method of forming a RF device as recited in claim 56 wherein the step of polishing the surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

63. The method of forming a RF device as recited in claim 57 wherein the step of polishing the surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

64. The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed at low pressure and in a low-humidity environment.

65. The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed in an inert gas atmosphere.

66. The method of forming a RF device as recited in claim 56 wherein the first and second modules are bonded together to thereby form a hermetically sealed cavity containing the at least one MEMS device.

67. The method of forming a RF device as recited in claim 56 wherein the step of fabricating the MEMS device comprises forming a switch.

68. The method of forming a RF device as recited in claim 56 further comprising the step of forming vertical interconnects extending through the first and second pluralities of LTCC layers.

69. The method of forming a RF device as recited in claim 56 further comprising the step of forming in the first plurality of LTCC layers a buffer layer that is a substrate on which the at least one MEMS device is fabricated.

70. The method of forming a RF device as recited in claim 56 further comprising the step of bonding to one of the first plurality of LTCC layers at least one integrated circuit.

71. The method of forming a RF device as recited in claim 70 further comprising the step of forming in the first plurality of LTCC layers an interconnect layer for interconnecting the integrated circuit to the MEMS device.

72. The method of forming a RF device as recited in claim 56 further comprising the step of fabricating in the first plurality of LTCC layers a plurality of buried-in discrete components.

73. The method of forming a RF device as recited in claim 72 wherein the discrete components include at least one device from the group consisting of resistors, capacitors and inductors.

74. The method of forming a RF device as recited in claim 56 further comprising the step of forming in the first and second pluralities of LTCC layers screen-printed buried metal patterns that are used to define interconnections and passive microwave devices.

75. The method of forming a RF device as recited in claim 74 wherein the passive microwave devices include at least one device from the group consisting of transmission lines, couplers, and dividers.

76. The method of forming a RF device as recited in claim 56 further comprising the step of forming in the first and second pluralities of LTCC layers photo-patterned buried metal patterns that are used to define interconnections and passive microwave devices.

77. The method of forming a RF device as recited in claim 76 wherein the passive microwave devices include at least one device from the group consisting of transmission lines, couplers, and dividers.

78. The method of forming a RF device as recited in claim 56 further comprising the step of forming in the second plurality of LTCC layers ground shielding extending through said layers to shield the at least one MEMS device from radiating.

79. The method of forming a RF device as recited in claim 70 further comprising the step of flip-chip bonding the integrated circuits to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

80. The method of forming a RF device as recited in claim 70 further comprising the step of wire-bonding the integrated circuits to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

81. The method of forming a RF device as recited in claim 70 further comprising the step of flip-chip bonding the integrated circuits to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

82. The method of forming a RF device as recited in claim 70 further comprising the step of wire-bonding the integrated circuits to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

83. The method of forming a RF device as recited in claim 56 wherein the MEMS process is performed in large-area-processing tools or standard semiconductor tools.

84. A method of forming an electrical device comprising the steps of:

fabricating a first module from a first plurality of low-temperature co-fired ceramic ("LTCC") layers, the first plurality of layers forming at least a first circuit used in the operation of the electrical device;

fabricating a second module from a second plurality of low-temperature co-fired ceramic ("LTCC") layers, the second plurality of layers forming at least a second circuit used in the operation of the electrical device;

polishing a surface of a front layer of the first module to be used as a substrate after fabrication of the first module is completed;

fabricating on the front layer at least one microelectromechanical device ("MEMS") using standard MEMS processing; and

bonding the first and second modules together to thereby form a cavity containing the at least one MEMS device.

85. The method of forming an MEMS device as recited in claim 84 further comprising the steps of polishing a surface of a back layer of the second module to

be used as a cover after fabrication of the second module is completed and applying two-component brazing materials on the front and back layers prior to bonding the first and second modules together.

86. The method of forming a MEMS device as recited in claim 84 wherein the step of bonding the first and second modules together is performed using eutectic bonding.

87. The method of forming a MEMS device as recited in claim 84 wherein the step of bonding the first and second modules together is performed using an insulating layer such as glass-frit.

88. The method of forming a MEMS device as recited in claim 84 wherein the step of bonding the first and second modules together is performed using an insulating layers such as a thermal setting polyimide film.

89. The method of forming an electrical device as recited in claim 84 wherein the step of applying two-component brazing materials on the front and back layers comprises the steps of:

depositing a plurality of first contact pads on a front layer of the first module;

planarizing the front layer of the first module;

depositing an adhesion layer and a soldering conductor on the first contact pads;

firing the first module at a temperature greater than 800º C;

depositing a plurality of second contact pads on a back layer of the second module;

planarizing the back layer of the second module;

depositing an adhesion layer and a soldering conductor on the second contact pads; and

firing the first module at a temperature greater than 800º C.

90. The method of forming an electrical device as recited in claim 84 wherein the step of polishing surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

91. The method of forming an electrical device as recited in claim 84 wherein the step of bonding the first and second modules together is performed at low pressure and in a low-humidity environment.

92. The method of forming an electrical device as recited in claim 84 wherein the first and second modules are bonded together to thereby form a hermetically sealed cavity containing the at least one MEMS device.

93. The method of forming an electrical device as recited in claim 84 further comprising the step of forming vertical interconnects extending through the first and second pluralities of LTCC layers.

94. The method of forming an electrical device as recited in claim 84 further comprising the step of bonding to one of the first plurality of LTCC layers at least one integrated circuit.

95. The method of forming an electrical device as recited in claim 94 further comprising the step of forming in the first plurality of LTCC layers an interconnect layer for interconnecting the integrated circuit to the electrical device.

96. The method of forming an electrical device as recited in claim 84 further comprising the step of fabricating in the first plurality of LTCC layers a plurality of buried-in discrete components.

97. The method of forming an electrical device as recited in claim 93 wherein the vertical interconnects are metal-filled vias.

98. The method of forming an electrical device as recited in claim 84 wherein the MEMS process is performed in large-area-processing tools or standard semiconductor tools.

99. A device which operates at radio frequencies compromising:

at least one microelectromechanical ("MEMS") variable capacitor,

a first substrate on which the MEMS variable capacitor is fabricated, the first substrate being comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers forming a first circuit used in the operation of the device, and

a second substrate comprised of a second plurality of LTCC layers forming at least a second circuit used in the operation of the device; and

wherein the second substrate is bonded to the first substrate so as to enclose the MEMS variable capacitor between the first and second substrates.

100. The device recited in claim 99 wherein the second substrate is bonded to the first substrate to form a hermetically sealed chamber containing the MEMS variable capacitor.

101. The device recited in claim 99 wherein the first and second pluralities of LTCC layers comprising the first and second substrates are interconnected by vertical interconnects extending through the layers.

102. The device recited in claim 99 wherein the first plurality of LTCC layers comprising the first substrate includes a buffer layer that serves as a substrate on which the MEMS variable capacitor is fabricated.

103. The device recited in claim 99 wherein the variable capacitor includes a movable electrode and wherein applied electrostatic actuation voltage deflects the movable electrode to thereby change the capacitance of the variable capacitor.

104. The device recited in claim 99 wherein the variable capacitor includes shaped electrodes whereby the relationship between the applied electrostatic actuation voltage and the capacitance of the variable capacitor is linear.

105. The device recited in claim 103 wherein the variable capacitor includes mechanical barriers to stop the deflection of the movable electrode at a predefined position to thereby set the tuning range of the device.

106. The device recited in claim 103 wherein the variable capacitor includes non-linear springs that provide a non-linear mechanical restoring force to the movable electrode so as to compensate for non-linearity in the applied electrostatic actuation voltage.

107. The device recited in claim 103 wherein the variable capacitor includes at least four electrodes so to provide for a two-port device and thereby de-couple the capacitance of the device from the actuation of said device.

108. The device recited in claim 99 further comprising at least one integrated circuit bonded to the first substrate.

109. The device recited in claim 108 wherein the first plurality of LTCC layers includes an interconnect layer through which the at least one integrated circuit is connected to the first substrate.

110. The device recited in claim 99 wherein the first plurality of LTCC layers includes a plurality of discrete components buried-in said layers.

111. The device recited in claim 110 wherein the first plurality of buried-in discrete components contains at least one component from the group consisting of is resistors, capacitors and inductors.

112. The device recited in claim 99 wherein the first and second pluralities of LTCC layers include at least one passive microwave device from the group consisting of transmission lines, couplers and dividers.

113. The device recited in claim 108 wherein the first plurality of LTCC layers includes a cavity in which the integrated circuits are bonded to the first plurality of LTCC layers.

114. The device recited in claim 113 wherein the integrated circuits include at least one circuit from a group consisting of low-frequency analog/digital ICs, MMICS, and RFICs.

115. The device recited in claim 113 wherein the integrated circuits include at least one circuit from a group consisting of a control circuit for the MEMS capacitor, a power module for the MEMS capacitor, a microprocessor, a signal processor, a high frequency power amplifier, a high frequency low noise amplifier, high frequency up and down converters.

116. The device recited in claim 108 wherein the second plurality of LTCC layers includes a ground shielding extending through said layers to shield the MEMS capacitor or IC from radiating components in other layers.

117. The device recited in claim 99 wherein the first and second pluralities of LTCC layers include ground planes for shielding the first and second circuits.

118. The device recited in claim 101 wherein the buffer layer is a plurality of layers.

119. The device recited in claim 113 wherein the integrated circuits are flip-chip bonded to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

120. The device recited in claim 113 wherein the integrated circuits are wire-bonded to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

121. The device recited in claim 113 wherein the integrated circuits are flip-chip bonded to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

122. The device recited in claim 113 wherein the integrated circuits are wire-bonded to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

123. The device recited in claim 113 wherein the integrated circuits are connected to the variable capacitor so as to provide electrical control and closed-loop control of the variable capacitor value.

124. A microelectromechanical variable capacitor device which operates at radio frequencies compromising:

a first substrate comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers forming a first circuit used in the operation of the device, and

a second substrate comprised of a second plurality of LTCC layers forming at least a second circuit used in the operation of the device; and

wherein the second substrate is bonded to the first substrate so as to enclose the MEMS variable capacitor device between the first and second substrates.

125. The MEMS device recited in Claim 124 wherein the second substrate is bonded to the first substrate to form a hermetically sealed chamber containing the MEMS variable capacitor device.

126. The MEMS device recited in Claim 124 wherein the first and second pluralities of LTCC layers comprising the first and second substrates are interconnected by vertical interconnects extending through the layers.

127. The MEMS device recited in Claim 124 wherein the first plurality of LTCC layers comprising the first substrate includes a buffer layer that serves as a substrate on which that the MEMS variable capacitor device is fabricated.

128. The MEMS device recited in Claim 124 wherein the variable capacitor device employs electrostatic actuation to deflect the movable electrode and thereby change the capacitance of the device.

129. The MEMS device recited in Claim 128 wherein the variable capacitor device employs electrodes that are shaped so as to linearize the applied electrostatic voltage versus capacitance relationship of the device.

130. The MEMS device recited in Claim 124 wherein the variable capacitor device employs mechanical barriers to stop the deflection of the movable electrode at a predefined location and thereby set the tuning range of the device.

131. The MEMS device recited in Claim 124 wherein the variable capacitor device uses non-linear springs so as to provide a non-linear mechanical restoring force to the movable electrode of the variable capacitor whereby the non-linear spring compensates for the non-linearity of the electrostatic actuation force.

132. The MEMS device recited in Claim 124 wherein the variable capacitor device employs at least four electrodes so to provide for a two-port device and thereby de-couple the capacitance of the device from the actuation of said device.

133. The MEMS variable capacitor device recited in Claim 124 further comprising at least one integrated circuit bonded to the first substrate.

134. The MEMS variable capacitor device recited in Claim 133 wherein the first plurality of LTCC layers includes an interconnect layer through which the at least one integrated circuit is connected to the first substrate.

135. The MEMS variable capacitor device recited in Claim 124 wherein the first plurality of LTCC layers includes a plurality of discrete components buried-in said layers.

136. The MEMS variable capacitor device recited in Claim 135 wherein the first plurality of buried-in discrete components contains at least one component from the group consisting of is resistors, or capacitors and inductors.

137. The MEMS variable capacitor device recited in claim 135 wherein the first and second pluralities of LTCC layers include at least one passive microwave device from the group consisting of transmission lines, couplers and dividers.

138. The MEMS variable capacitor device recited in claim 135 wherein the first plurality of LTCC layers includes a cavity in which the integrated circuits are bonded to the first plurality of LTCC layers.

139. The MEMS variable capacitor device recited in claim 135 wherein the integrated circuits include at least one circuit from a group consisting of low-frequency analog/digital ICs, MMICS, and RFICs.

140. The MEMS variable capacitor device recited in claim 135 wherein the integrated circuits include at least one circuit from a group consisting of a control circuit for the MEMS variable capacitor device, a power module for the MEMS variable capacitor device, a microprocessor.

141. The MEMS variable capacitor device recited in claim 135 wherein the second plurality of LTCC layers includes a ground shielding extending through said layers to shield the variable capacitor MEMS device or IC from radiating components in other layers.

142. The MEMS variable capacitor device recited in claim 135 wherein the first and second pluralities of LTCC layers include ground planes for shielding the first and second circuits.

143. The MEMS variable capacitor device recited in claim 132 wherein the buffer layer is a plurality of layers.

144. The MEMS variable capacitor device recited in claim 134 wherein the integrated circuits are flip-chip bonded to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

145. The MEMS variable capacitor device recited in claim 134 wherein the integrated circuits are wire-bonded to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

146. The MEMS variable capacitor device recited in claim 136 wherein the integrated circuits are flip-chip bonded to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

147. The MEMS variable capacitor device recited in claim 136 wherein the integrated circuits are wire-bonded to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

148. The MEMS variable capacitor device recited in claim 124 wherein the capacitance of the device is adjusted by application of an electrical signal to said device.

149. The MEMS variable capacitor device recited in Claim 148 wherein the variable capacitor is actuated electrostatically.

150. The MEMS variable capacitor device recited in Claim 148 wherein the variable capacitor is electrostatically and zipper actuated so as to increase the tuning range of said MEMS variable capacitor device.

151. The MEMS device recited in Claim 150 wherein the variable capacitor device includes electrodes that are shaped so as to linearize the applied electrostatic voltage versus capacitance relationship of the device.

152. The MEMS device recited in Claim 150 wherein the variable capacitor device includes mechanical barriers to stop the deflection of the movable electrode at a predefined location and thereby set the tuning range of the device.

153. The MEMS device recited in Claim 150 wherein the variable capacitor device includes at least four electrodes so to provide for a two-port device and thereby de-couples the capacitance of the device from the actuation of said device.

154. The MEMS variable capacitor device recited in Claim 150 wherein the variable capacitor includes mechanical stops that prevent shorting of the capacitor electrodes.

155. A microelectromechanical (MEMS) tunable inductor device which operates at radio frequencies compromising:

a first substrate comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers forming a first circuit used in the operation of the device,

a second substrate comprised of a second plurality of LTCC layers forming at least a second circuit used in the operation of the device;

a plurality of radio frequency ("RF") microelectromechanical switches fabricated on the first substrate,

a network of parallel inductors also fabricated on the first substrate, and

wherein the second substrate is bonded to the first substrate so as to enclose the RF MEMS switches and inductors between the first and second substrates.

156. The MEMS device recited in Claim 155 wherein the second substrate is bonded to the first substrate to form a hermetically sealed chamber containing the plurality of MEMS switches and inductors.

157. The MEMS device recited in Claim 155 wherein the first and second pluralities of LTCC layers comprising the first and second substrates are interconnected by vertical interconnects extending through the layers.

158. The MEMS device recited in Claim 155 wherein the first plurality of LTCC layers comprising the first substrate includes a buffer layer that serves as a substrate on which a plurality of MEMS switches and inductors devices are fabricated.

159. The MEMS device recited in Claim 155 wherein the plurality of MEMS switch devices are actuated by the application of an electrostatic voltage to select the desired inductor in the network.

160. A microelectromechanical systems (MEMS) tunable inductor-capacitor network device which operates at radio frequencies compromising:

a first substrate comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers forming a first circuit used in the operation of the device or system,

a second substrate comprised of a second plurality of LTCC layers forming at least a second circuit used in the operation of the device,

a plurality of RF microelectromechanical switches fabricated on the first substrate,

a network of parallel inductor devices formed on the first substrate, and

at least one variable capacitor device formed on the first substrate,

wherein the second substrate is bonded to the first substrate so as to enclose the at least one MEMS switches and inductor and capacitor devices between the first and second substrates.

161. The MEMS device recited in Claim 160 wherein the second substrate is bonded to the first substrate to form a hermetically sealed chamber containing the plurality of MEMS switches and MEMS variable capacitors.

162. The MEMS device recited in Claim 160 wherein the first and second pluralities of LTCC layers comprising the first and second substrates are interconnected by vertical interconnects extending through the layers.

163. The MEMS device recited in Claim 160 wherein the first plurality of LTCC layers comprising the first substrate includes a buffer layer that serves as a substrate on which a plurality of MEMS switches and inductors devices are fabricated.

164. The MEMS device recited in Claim 160 wherein the plurality of MEMS switch devices employ electrostatic actuation to select the desired inductor in the network.

165. The MEMS device recited in Claim 160 wherein the plurality of MEMS variable capacitor devices employ electrostatic actuation to select the desired inductor in the network

166. The MEMS device recited in Claim 160 wherein the tunable inductor-capacitor network is used a tunable filter.

167. A phased array antenna system comprising:

a plurality of sub-array modules integrated together to form the phased array antenna, and

at least one amplifier connected to the plurality of sub-array modules,

each of the sub-array modules being comprised of a plurality of radiating elements, each of the radiating elements including:

a first module comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers forming at least one first circuit used in the operation of the phased array antenna;

a second module comprised of a second plurality of LTCC layers forming at least a second circuit used in the operation of the phased-array antenna;

at least one radiating patch formed on the second module; and

at least one phase shifter fabricated from at least one microelectromechanical ("MEMS"),switch and formed between the first and second modules; and

wherein the second module is bonded to the first module so as to enclose the at least one MEMS phase shifter between the first and second modules.

168. The phased array antenna system recited in claim 167 wherein the second module is bonded to the first module to form a hermetically sealed chamber containing the at least one MEMS phase shifter.

169. The phased array antenna system recited in claim 167 wherein the first and second pluralities of LTCC layers are interconnected by vertical interconnects extending through the layers.

170. The phased array antenna system recited in claim 167 wherein the at least one second circuit formed in the second plurality of LTCC layers is a polarizer circuit.

171. The phased array antenna system recited in claim 167 wherein the at least one first circuit formed in the first plurality of LTCC layers is a plurality of circuits including a power divider circuit and a band pass filter circuit.

172. The phased array antenna system recited in claim 167 wherein the first plurality of LTCC layers includes a buffer layer that serves as a substrate on which the at least one MEMS phase shifter is fabricated.

173. The phased array antenna system recited in claim 167 further comprising at least one integrated circuit bonded to the first module.

174. The phased array antenna system recited in claim 173 wherein the first plurality of LTCC layers includes an interconnect layer through which the at least one integrated circuit is connected to the first module.

175. The phased array antenna system recited in claim 167 wherein the system includes a plurality of amplifiers, each of the amplifiers being connected to a corresponding one of the plurality of sub-array modules.

176. The phased array antenna system recited in claim 167 wherein each of the radiating elements includes a plurality of radiating patches and a corresponding plurality of MEMS phase shifters.

177. The phased array antenna system recited in claim 167 wherein the first plurality of LTCC layers includes a plurality of discrete components buried-in said layers.

178. The phased array antenna system recited in claim 177 wherein the plurality of buried-in discrete components is resistors, capacitors, and/or inductors.

179. The phased array antenna system recited in claim 167 wherein the first and second pluralities of LTCC layers include at least one passive microwave device selected from the group consisting of transmission lines, couplers, and dividers.

180. The phased array antenna system recited in claim 173 wherein the first plurality of LTCC layers includes a cavity in which the integrated circuits are bonded to the first array antenna.

181. The phased array antenna system recited in claim 173 wherein the integrated circuits include at least one circuit selected from a group consisting of low-frequency analog/digital ICs, MMICs, and RFICs.

182. The phased array antenna system recited in claim 173 wherein the integrated circuits include at least one circuit from a group consisting of a control circuit for the MEMS phase shifter, a power module for the MEMS phase shifter, a microprocessor, a signal processor, a high frequency power amplifier, a high frequency low noise amplifier, high frequency down or up converters.

183. The phased array antenna system recited in claim 167 wherein the second plurality of LTCC layers includes ground shielding extending through said layers to shield the at least one radiating element from radiating elements in other phase antennas.

184. The phased array antenna system recited in claim 167 wherein the first and second pluralities of LTCC layers include ground planes for shielding the first and second circuits.

185. The phased array antenna system recited in claim 172 wherein the buffer layer is a plurality of layers.

186. The phased array antenna system recited in claim 173 wherein the integrated circuits are flip-chip bonded to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

187. The phased array antenna system recited in claim 173 wherein the integrated circuits are wire-bonded to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

188. The phased array antenna system recited in claim 173 wherein the integrated circuits are flip-chip bonded to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

189. The phased array antenna system recited in claim 173 wherein the integrated circuits are wire-bonded to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

190. The phased array antenna system recited in claim 167 wherein the second plurality of LTCC layers includes a plurality of radiation layers on which is fabricated the at least one radiating element.

191. A phased array antenna system comprising:

a plurality of low-temperature co-fired ceramic ("LTCC") modules integrated together, and

at least one amplifier connected to the plurality of LTCC modules, each LTCC module being a radiating element and being comprised of:

a first plurality of LTCC layers forming at least one first circuit used in the operation of the phased array antenna;

a second plurality of LTCC layers forming at least a second circuit used in the operation of the phased-array antenna;

at least one microelectromechanical ("MEMS") device formed between the first and second pluralities of LTCC layers, the second plurality of LTCC layers being bonded to the first plurality of LTCC layers whereby the at least one MEMS device is enclosed between the first and second pluralities of LTCC layers; and

at least one radiating patch formed on the second plurality of LTCC layers.

192. The phased array antenna system recited in claim 191 wherein the second plurality of LTCC layers is bonded to the first plurality of LTCC layers to form a hermetically sealed chamber containing the at least one MEMS device.

193. The phased array antenna system recited in claim 191 wherein the first plurality of LTCC layers includes a buffer layer that serves as a substrate on which the at least one MEMS device is fabricated.

194. The phased array antenna system recited in claim 191 further comprising at least one integrated circuit bonded to the first plurality of LTCC layers.

195. The phased array antenna system recited in claim 194 further comprising a plurality of integrated circuits including at least one circuit from a group consisting of low-frequency analog/digital ICs, MMICs, and RFICs.

196. The phased array antenna system recited in claim 194 further comprising a plurality of integrated circuits including at least one circuit from a group consisting of a control circuit for the MEMS device, a power module for the MEMS device, a microprocessor, a signal processor, a high frequency power amplifier, a high frequency low noise amplifier, high frequency down-converters.

197. An array antenna comprising:

a first ceramic module formed from of a first plurality of dielectric layers, the first plurality of dielectric layers including at least one first circuit layer;

a second ceramic module formed from of a second plurality of dielectric layers, the second plurality of dielectric layers including at least one second circuit layer,

a layer between the first and second ceramic modules including at least one microelectromechanical switch ("MEMS") forming at least one phase-shifter, a second ceramic module being bonded to the first ceramic module and thereby forming a cavity on top of the MEMS switch.

198. The array antenna of claim 197, wherein the ceramic modules are formed using an LTCC process.

199. The array antenna of claim 197, wherein the ceramic modules are formed using an HTCC process.

200. An array antenna comprising:

a first ceramic module formed from of a first plurality of dielectric layers, the first plurality of dielectric layers including at least one first circuit layer, a buffer layer, and a plurality of interconnections between the at least one first circuit layer and the buffer layer;

a second ceramic module formed from of a second plurality of dielectric layers, the second plurality of dielectric layers including at least one second circuit layer, a cover layer, a plurality of radiation layers, and a plurality of interconnections between the second circuit layer, cover layer, and radiation layers; and

a layer between the first and second ceramic modules including at least one microelectromechanical switch ("MEMS") forming at least one phase-shifter.

201. The array antenna of claim 200 further comprising a plurality of integrated circuits mounted on the first ceramic module, the first plurality of dielectric layers further including interconnecting layers for connecting the integrated circuits to the dielectric layers forming the first and second ceramic modules.

202. The array antenna of claim 200, wherein the ceramic modules are formed using an LTCC process.

203. The array antenna of claim 200, wherein the ceramic modules are formed using an HTCC process.

204. A method of forming a radiating element for an array antenna comprising the steps of:

fabricating a first module from a first plurality of low-temperature co-fired ceramic ("LTCC") layers, the first plurality of layers forming at least a first circuit used in the operation of the array antenna;

fabricating a second module from a second plurality of low-temperature co-fired ceramic ("LTCC") layers, the second plurality of layers forming at least a second circuit used in the operation of the array antenna;

polishing a surface of a front layer of the first module to be used as a substrate after fabrication of the first module is completed;

fabricating on the front layer at least one microelectromechanical switch ("MEMS") using MEMS processing; and

bonding the first and second modules together to thereby form a cavity containing the at least one MEMS switch.

205. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the steps of polishing a surface of a back layer of the second module to be used as a cover after fabrication of the second module is completed and applying two-component brazing materials on the front and back layers prior to bonding the first and second modules together.

206. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed using eutectic bonding.

207. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed using an insulating layer such as glass-frit.

208. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed using an insulating layers such as a thermalsetting polyimide film.

209. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of applying two-component brazing materials on the front and back layers comprises the steps of:

depositing a plurality of first contact pads on a front layer of the first module;

planarizing the front layer of the first module;

depositing an adhesion layer and a soldering conductor on the first contact pads;

firing the first module at a temperature greater than 800º C;

depositing a plurality of second contact pads on a back layer of the second module;

planarizing the back layer of the second module; (optional)

depositing an adhesion layer and a soldering conductor on the second contact pads; and

firing the first module at a temperature greater than 800º C.

210. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of polishing the surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

211. The method of forming a radiating element for an array antenna as recited in claim 205 wherein the step of polishing the surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

212. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed at low pressure and in a low-humidity environment.

213. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed in an inert gas atmosphere.

214. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the first and second modules are bonded together to thereby form a hermetically sealed cavity containing the at least one MEMS switch.

215. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the MEMS switch is a phase shifter.

216. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming vertical interconnects extending through the first and second pluralities of LTCC layers.

217. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming a polarizer circuit in the second plurality of LTCC layers.

218. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming a power divider circuit and a band pass filter circuit in the first plurality of LTCC layers.

219. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming in the first plurality of LTCC layers a buffer layer that is a substrate on which the at least one MEMS phase shifter is fabricated.

210. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of bonding to one of the first plurality of LTCC layers at least one integrated circuit.

211. The method of forming a radiating element for an array antenna as recited in claim 210 further comprising the step of forming in the first plurality of LTCC layers an interconnect layer for interconnecting the integrated circuit to the array antenna.

212. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming in the second plurality of LTCC layers a plurality of radiating layers with at least one radiating patch fabricated on one of the radiating layers.

213. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of fabricating in the first plurality of LTCC layers a plurality of buried-in discrete components.

214. The method of forming a radiating element for an array antenna as recited in claim 213 wherein the discrete components are resistors, capacitors, and/or inductors.

215. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming in the first and second pluralities of LTCC layers screen-printed buried metal patterns that are used to define interconnections and passive microwave devices.

216. The method of forming a radiating element for an array antenna as recited in claim 215 wherein the passive microwave devices include at least one device from the group consisting of transmission lines, couplers, and dividers.

217. The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming in the first and second

pluralities of LTCC layers photo-patterned buried metal patterns that are used to define interconnections and passive microwave devices.

218. The method of forming a radiating element for an array antenna as recited in claim 217 wherein the passive microwave devices include at least one device from the group consisting of transmission lines, couplers, and dividers.

219. The method of forming a radiating element for an array antenna as recited in claim 212 further comprising the step of forming in the second plurality of LTCC layers ground shielding extending through said layers to shield the at least one radiating patch from radiating patches in other array antennas.

220. The method of forming a radiating element for an array antenna as recited in claim 211 further comprising the step of flip-chip bonding the integrated circuits to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

221. The method of forming a radiating element for an array antenna as recited in claim 211 further comprising the step of wire-bonding the integrated circuits to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

222. The method of forming a radiating element for an array antenna as recited in claim 211 further comprising the step of flip-chip bonding the integrated

circuits to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

223. The method of forming a radiating element for an array antenna as recited in claim 211 further comprising the step of wire-bonding the integrated circuits to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

224. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the MEMS process is performed in large-area-processing tools or standard semiconductor tools.

225. A method of forming an array antenna comprising the steps of:

fabricating a plurality of radiating elements, each of the radiating elements being fabricated by forming at least one microelectromechanical ("MEMS") switch on a first low-temperature co-fired ceramic ("LTCC") module, and bonding a second LTCC bonded to the first LTCC module, whereby the MEMS switch is located in a cavity between the first and second LTCC modules;

forming a plurality of sub-array modules, each of the sub-array modules being formed from a plurality of radiating elements;

integrating the plurality of sub-array modules together to form the phased array antenna; and

connecting the plurality of sub-array modules to at least one amplifier.

226. A method of forming an electrical device comprising the steps of:

fabricating a first module from a first plurality of low-temperature co-fired ceramic ("LTCC") layers, the first plurality of layers forming at least a first circuit used in the operation of the electrical device;

fabricating a second module from a second plurality of low-temperature co-fired ceramic ("LTCC") layers, the second plurality of layers forming at least a second circuit used in the operation of the electrical device;

polishing a surface of a front layer of the first module to be used as a substrate after fabrication of the first module is completed;

fabricating on the front layer at least one microelectromechanical device ("MEMS") using standard MEMS processing; and

bonding the first and second modules together to thereby form a cavity containing the at least one MEMS device.

227. The method of forming an array antenna as recited in claim 226 further comprising the steps of polishing a surface of a back layer of the second module to be used as a cover after fabrication of the second module is completed and applying two-component brazing materials on the front and back layers prior to bonding the first and second modules together.

228. The method of forming an array antenna as recited in claim 226 wherein the step of bonding the first and second modules together is performed using eutectic bonding.

229. The method of forming an array antenna as recited in claim 226 wherein the step of bonding the first and second modules together is performed using an insulating layer such as glass-frit.

230. The method of forming an array antenna as recited in claim 226 wherein the step of bonding the first and second modules together is performed using an insulating layers such as a thermal setting polyimide film.

231. The method of forming an electrical device as recited in claim 226 wherein the step of applying two-component brazing materials on the front and back layers comprises the steps of:

depositing a plurality of first contact pads on a front layer of the first module;

planarizing the front layer of the first module;

depositing an adhesion layer and a soldering conductor on the first contact pads;

firing the first module at a temperature greater than 800º C;

depositing a plurality of second contact pads on a back layer of the second module;

planarizing the back layer of the second module;

depositing an adhesion layer and a soldering conductor on the second contact pads; and

firing the first module at a temperature greater than 800º C.

232. The method of forming an electrical device as recited in claim 226 wherein the step of polishing surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

233. The method of forming an electrical device as recited in claim 226 wherein the step of bonding the first and second modules together is performed at low pressure and in a low-humidity environment.

234. The method of forming an electrical device as recited in claim 226 wherein the first and second modules are bonded together to thereby form a hermetically sealed cavity containing the at least one MEMS device.

235. The method of forming an electrical device as recited in claim 226 further comprising the step of forming vertical interconnects extending through the first and second pluralities of LTCC layers.

236. The method of forming an electrical device as recited in claim 226 further comprising the step of bonding to one of the first plurality of LTCC layers at least one integrated circuit.

237. The method of forming an electrical device as recited in claim 236 further comprising the step of forming in the first plurality of LTCC layers an interconnect layer for interconnecting the integrated circuit to the electrical device.

238. The method of forming an electrical device as recited in claim 226 further comprising the step of fabricating in the first plurality of LTCC layers a plurality of buried-in discrete components.

239. The method of forming an electrical device as recited in claim 235 wherein the vertical interconnects are metal-filled vias.

240. The method of forming an electrical device as recited in claim 226 wherein the MEMS process is performed in large-area-processing tools or standard semiconductor tools.

241. The method of forming a radiating element for an array antenna as recited in claim 209 wherein the step of polishing the surfaces of the front and back layers is performed using a selectively protective and removable layer on exposed metal during polishing to prevent or reduce dishing.

242. The method of forming a radiating element for an array antenna as recited in claim 218 wherein the at least one MEMS switch contained in the hermetically sealed cavity is coated with a surface treatment to prevent stiction.

243. The method of forming a radiating element for an array antenna as recited in claim 242 wherein the at least one MEMS switch is coated with a surface treatment selected from the group consisting of dichlorodimethylsilane (DDMS) monolayer and octadecyltrichlorosilane (OTS) self-assembled monolayer.

244. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the at least one MEMS switch is sealed with a surface treatment to prevent stiction.

245. The method of forming a radiating element for an array antenna as recited in claim 204 wherein the at least one MEMS switch is sealed with a surface treatment to prevent stiction and maintain low-resistance contacts in the at least one MEMS switch by avoiding contamination and unwanted chemical reactions, such as oxidation.

246. The method of forming a radiating element for an array antenna as recited in claim 244 wherein the at least one MEMS switch is sealed with a surface treatment selected from the group consisting of dichlorodimethylsilane (DDMS) monolayer and octadecyltrichlorosilane (OTS) self-assembled monolayer.

247. The method of forming a radiating element for an array antenna as recited in claim 244 wherein the at least one MEMS switch is sealed with a product that can be used on metal surfaces to minimize unintentional adhesion in mechanical switches or other contacting or near-contacting surfaces.

247. A phased array antenna system comprising:

a plurality of sub-array modules formed on a low-temperature co-fired ceramic ("LTCC") wafer, and

at least one amplifier connected to the plurality of sub-array modules,

each of the sub-array modules being comprised of a plurality of radiating elements, each of the radiating elements including:

a first module comprised of a first plurality of LTCC layers forming at least one first circuit used in the operation of the phased array antenna;

a second module comprised of a second plurality of LTCC layers forming at least a second circuit used in the operation of the phased-array antenna;

at least one radiating patch formed on the second module; and

at least one phase shifter fabricated from at least one microelectromechanical ("MEMS") switch and formed between the first and second modules; and

wherein the second module is bonded to the first module so as to enclose the at least one MEMS phase shifter between the first and second modules.

249. A phased array antenna system comprising:

a plurality of sub-array modules integrated together to form the phased array antenna, each of the sub-array modules being comprised of a plurality of radiating elements, each of the radiating elements including:

a first module comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers forming at least one first circuit used in the operation of the phased array antenna;

a second module comprised of a second plurality of LTCC layers forming at least a second circuit used in the operation of the phased-array antenna;

at least one radiating patch and at least one amplifier connected to the radiating patch formed on the second module; and

at least one phase shifter fabricated from at least one microelectromechanical ("MEMS") switch and formed between the first and second modules; and

wherein the second module is bonded to the first module so as to enclose the at least one MEMS phase shifter between the first and second modules.

250. A phased array antenna system comprising:

a plurality of sub-array modules integrated together to form the phased array antenna, and

at least one amplifier connected to the plurality of sub-array modules,

each of the sub-array modules being comprised of a plurality of radiating elements, each of the radiating elements including:

at least a first module comprised of a first plurality of low-temperature co-fired ceramic ("LTCC") layers forming at least one first circuit used in the operation of the phased array antenna;

at least a second module comprised of a second plurality of LTCC layers forming at least a second circuit used in the operation of the phased-array antenna;

at least one radiating patch formed on the second module; and

at least one phase shifter fabricated from at least one microelectromechanical ("MEMS") switch and formed between the first and second modules; and

wherein the second module is bonded to the first module so as to enclose the at least one MEMS phase shifter between the first and second modules.

251. A radio frequency system compromising:

a plurality of modules formed on a low-temperature co-fired ceramic ("LTCC") wafer, each of the modules including:

at least one microelectromechanical ("MEMS") device,

at least a first plurality of LTCC layers forming at least one first circuit used in the operation of the MEMS device, and

at least a second plurality of LTCC layers forming at least one second circuit used in the operation of the MEMS device,

Wherein the MEMS device is formed between the first and second pluralities of LTCC layers, the second plurality of LTCC layers being bonded to the first plurality of LTCC layers whereby the MEMS device is enclosed between the first and second pluralities of LTCC layers.

252. The MEMS device of claim 32, wherein the ceramic modules are formed from 943 Green Tape™.

253. The MEMS device of claim 32, wherein the ceramic modules are formed from 951 Green Tape™.

254. The MEMS device of claim 42, wherein the ceramic modules are formed from 943 Green Tape™.

255. The MEMS device of claim 42, wherein the ceramic modules are formed from 951 Green Tape™.

256. The MEMS device of claim 198, wherein the ceramic modules are formed from 943 Green Tape™.

257. The MEMS device of claim 198, wherein the ceramic modules are formed from 951 Green Tape™.

258. The MEMS device of claim 202, wherein the ceramic modules are formed from 943 Green Tape™.

259. The MEMS device of claim 202, wherein the ceramic modules are formed from 951 Green Tape™.